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AUTHOR Hanson, Keith R.
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ABSTRACT

This storybook discusses the concepts of matter, energy, life, and time. The ideas of ecology, natural resources, and recycling are presented in a format which can be easily read by elementary school students. (CW)

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

PLANET EARTH

An Owner's Manual

by Keith R. Hanson

A GUIDE TO HOW THINGS WORK

THE SCHOOL BOARD OF LEE COUNTY
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1987

Title: Planet Earth - An Owner's Manual - - A Guide To How Things Work

Text and Drawings by Keith R. Hanson, Resource Teacher
Environmental Education and
Instructional Development Services
Lee County Schools

The development of Planet Earth was funded jointly by the Lee County School Board and the Florida Office of Environmental Education Mini-Grant Program.

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INTRODUCTION

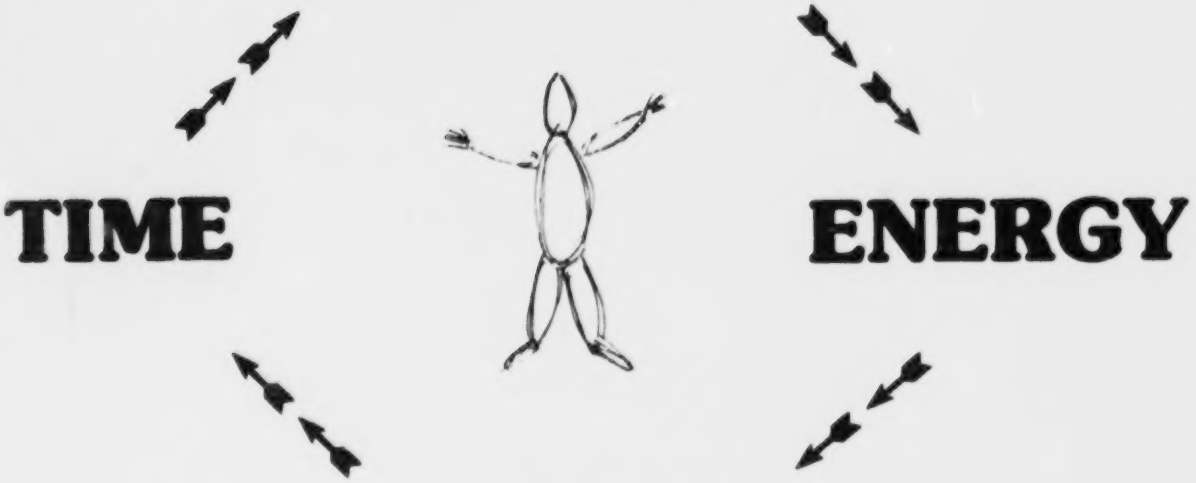
Some books about science are very hard to read.

Some books are very easy.

The strange thing is that, in science and in life, the simplest things are often the hardest to understand.

And the things which seem complicated are often easy to understand.

MATTER



This book is an easy book to read.

It's about the most basic ideas studied by scientists.

Matter, energy, life, and time.

But, these basic ideas have challenged the best scientific minds of all time.

Many people today don't really know much about them.

I hope you will read this simple book about simple ideas that can also be very, very complicated.

And I hope you will know more when you are finished with our story.

Now, it's up to you.

AN OWNER'S MANUAL?

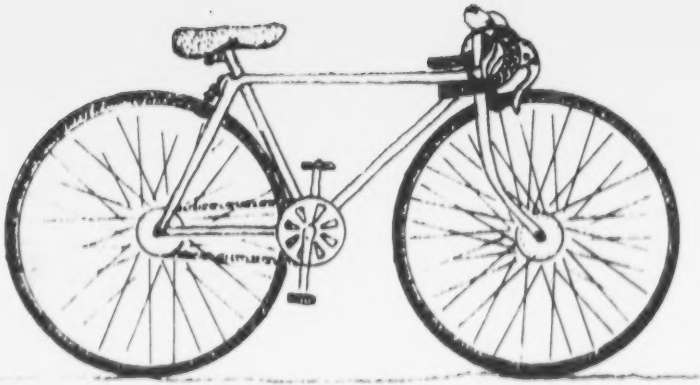
x 12

What is an owner's manual?

Who needs one?

Well, let's think about what an owner's manual might do for you.

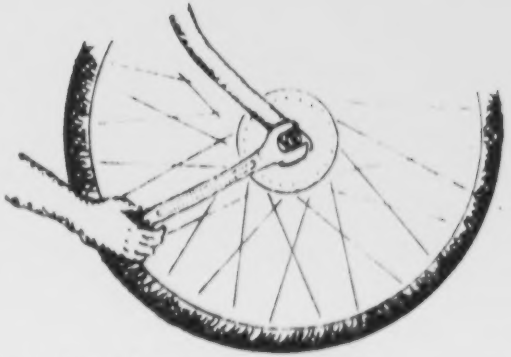
When you buy a new bicycle, you get a book that tells you. . .



about your
new

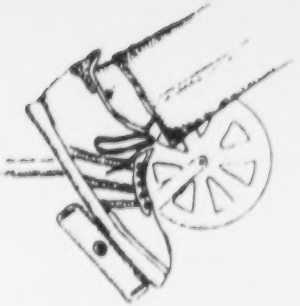
BIKE

. . . how to put it together,



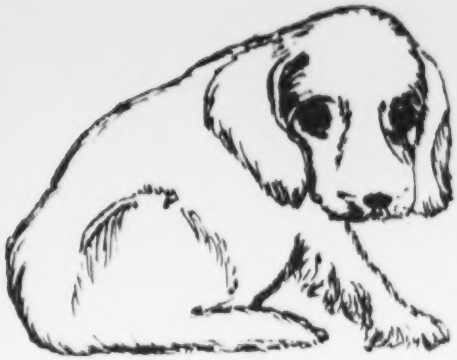
how to keep it clean and shiny,

how to ride it safely,



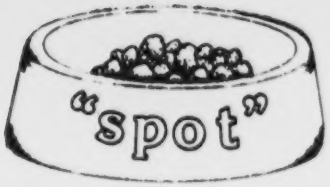
and how to fix it if something goes wrong.

If you buy a new puppy,



you get a book that tells you,

5



what kind of food to feed it,

how to train it,

and how to care for it if it gets sick.

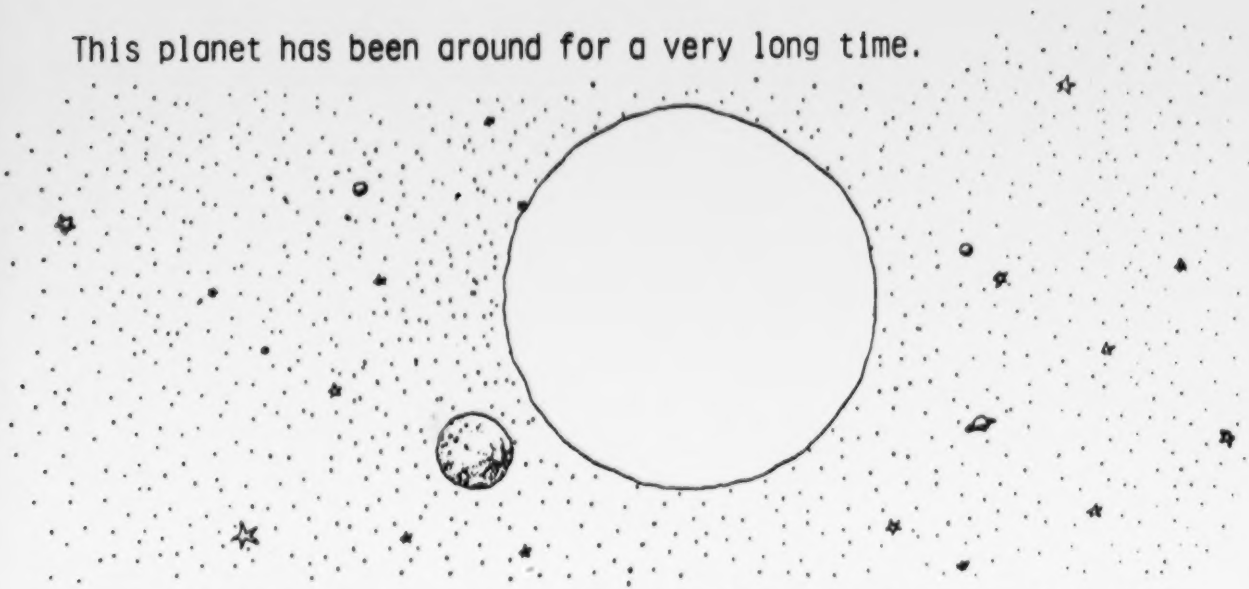
Well, this book will tell you a little about something we all own.

Or, maybe none of us really owns it, but we all just share it together.

Our home. . .

. . .the Planet Earth.

This planet has been around for a very long time.



Much longer than you or I or anyone else that ever lived on this planet.

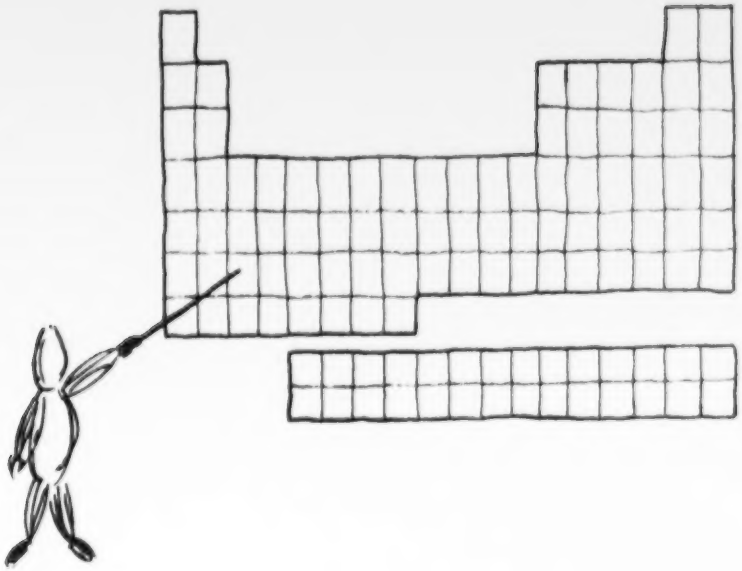
There have been a lot of changes on the Earth since it was formed.

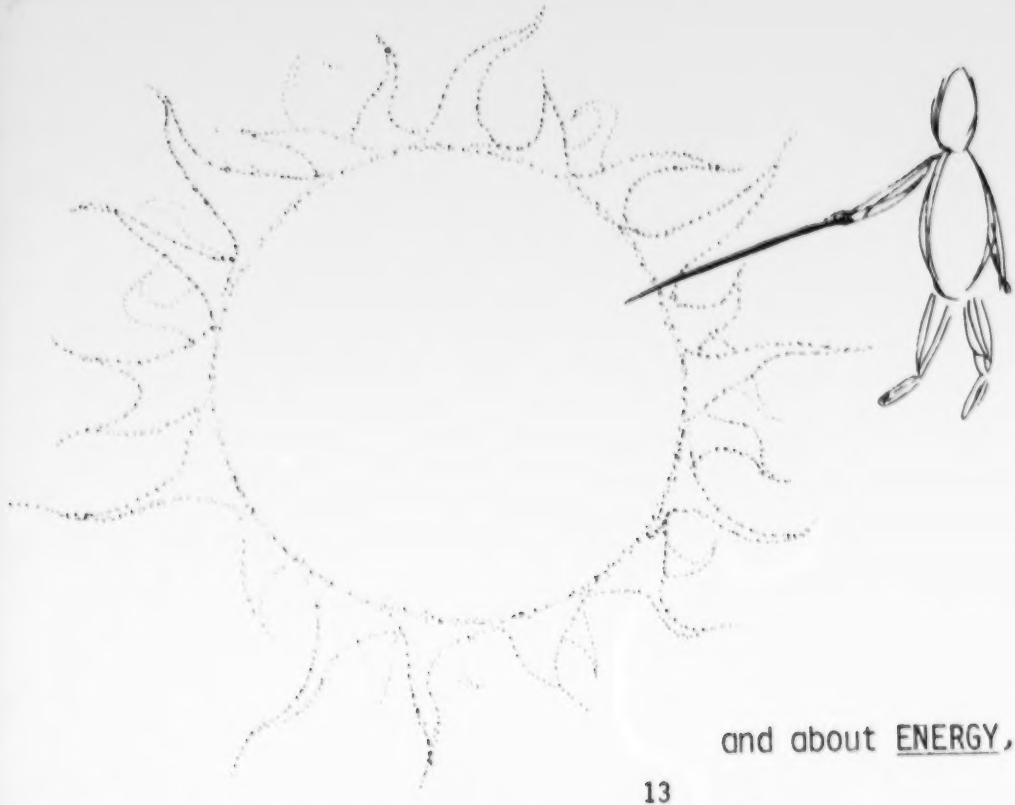
Many of these changes that occurred in the past are still going on today.

This book is about <u>how</u> these things are happening.

After you have read this book,

and learned a little about MATTER.





and about ENERGY,

and about LIFE,

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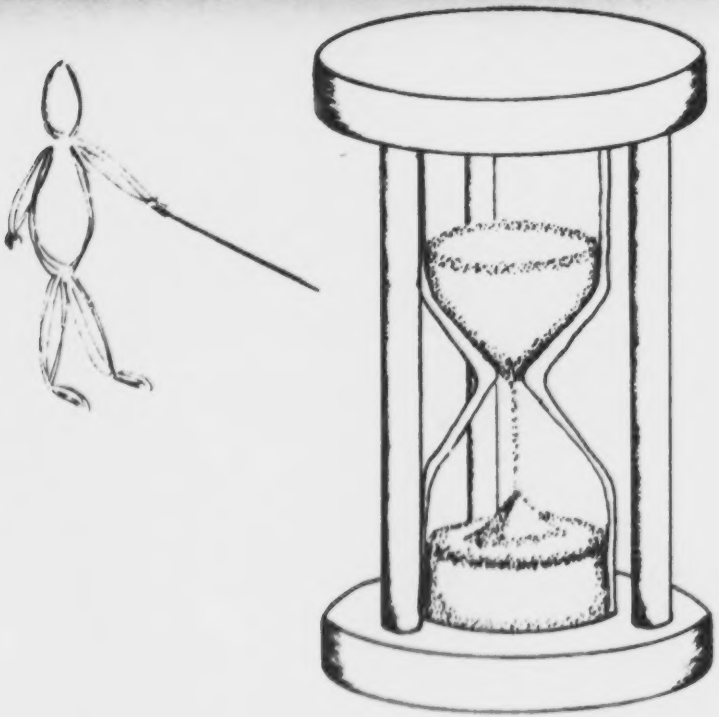
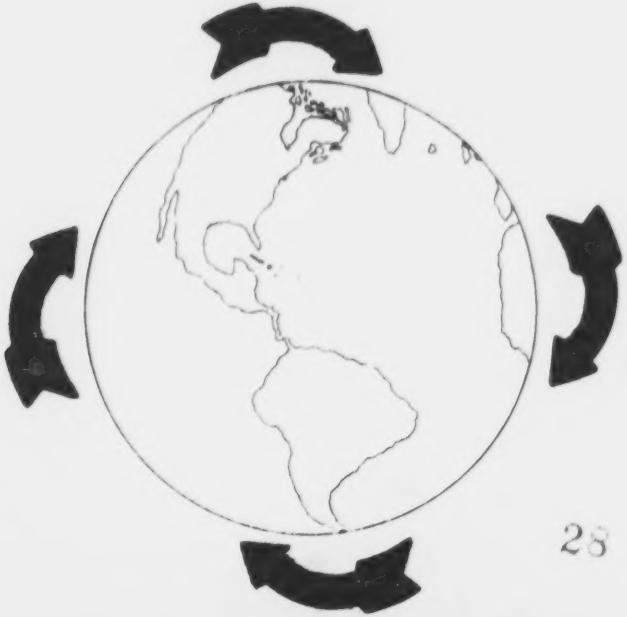
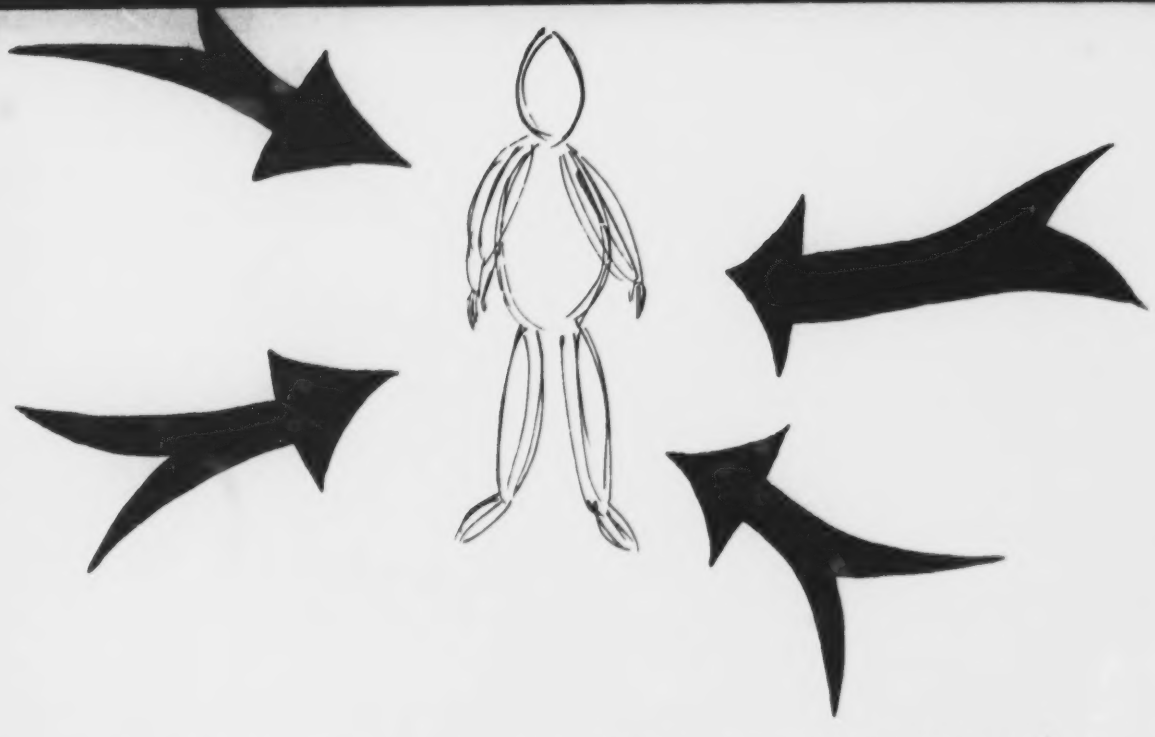


and about TIME,

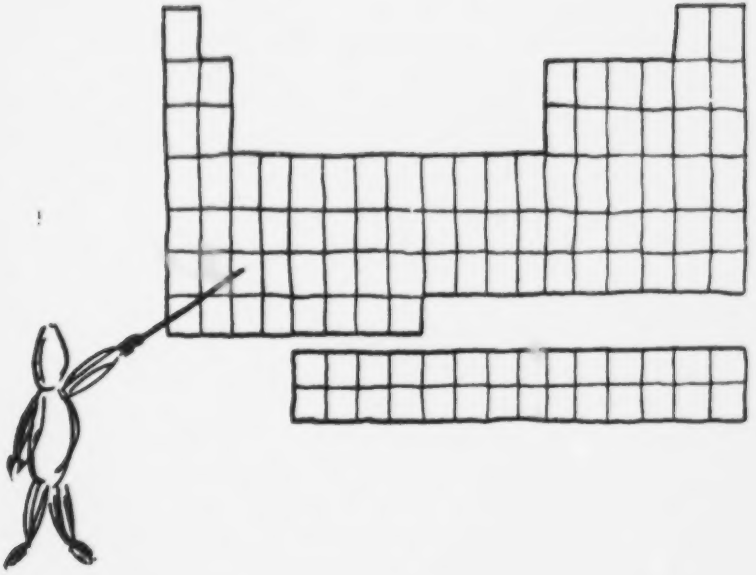
then you will know how MATTER, and ENERGY, and LIFE, and TIME all work together to make the Earth such a good place to live.



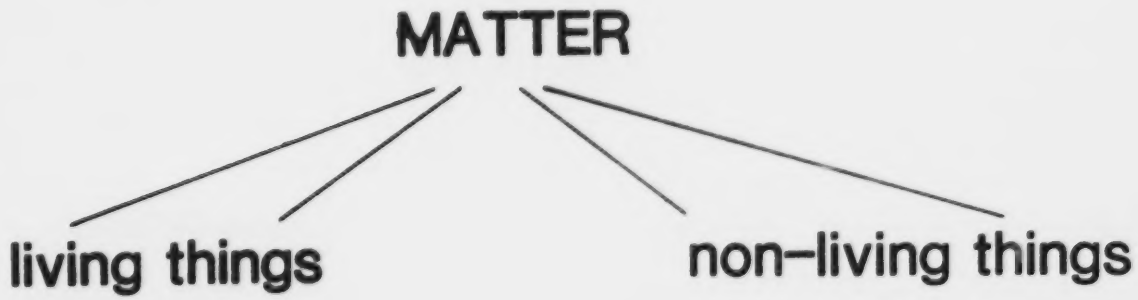


And maybe you will learn a little about yourself, too!

MATTER

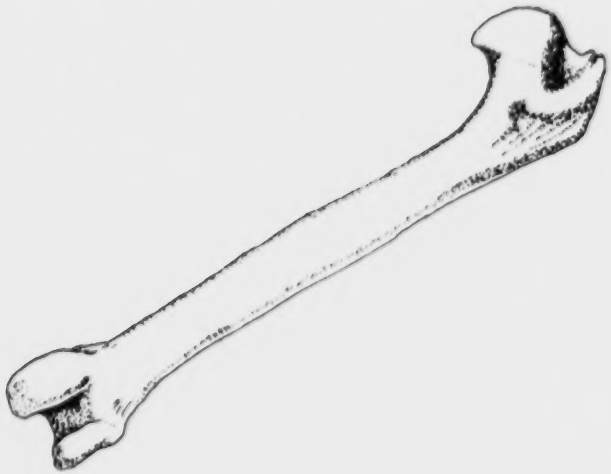


Matter is the material that things are made of. Living things and non-living things are made of matter.



Sticks,

and stones,



and dinosaur bones are <u>all</u> made of matter.

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You and I, and everything else on this Earth are made of matter.

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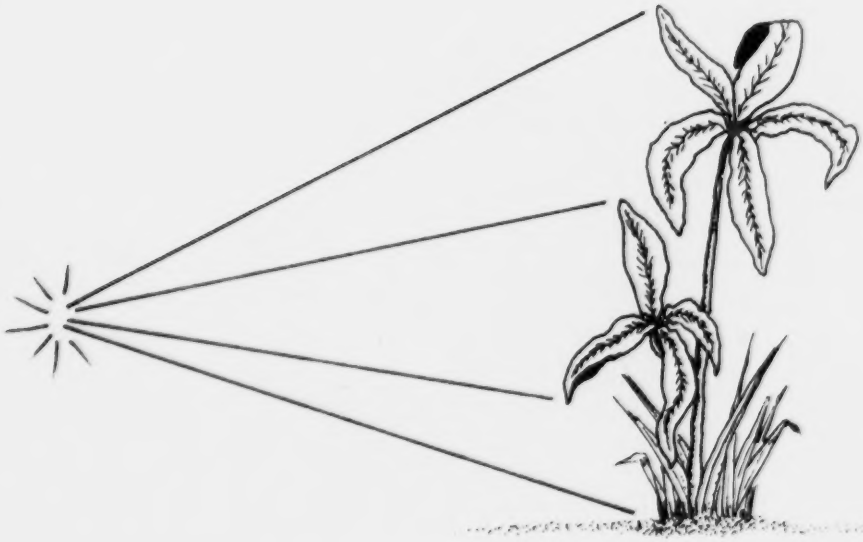

When a new tree grows,

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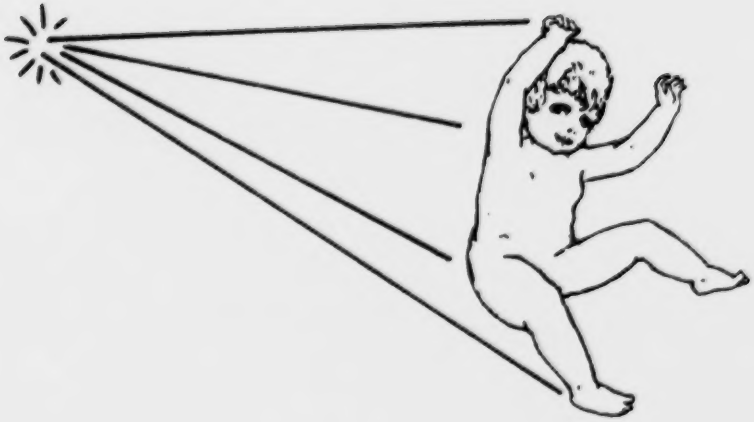
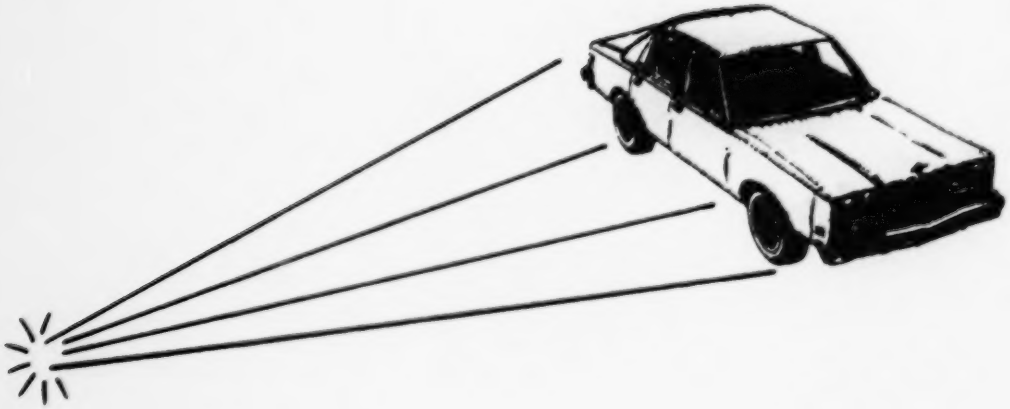
or a baby is born,



or a new automobile is made,

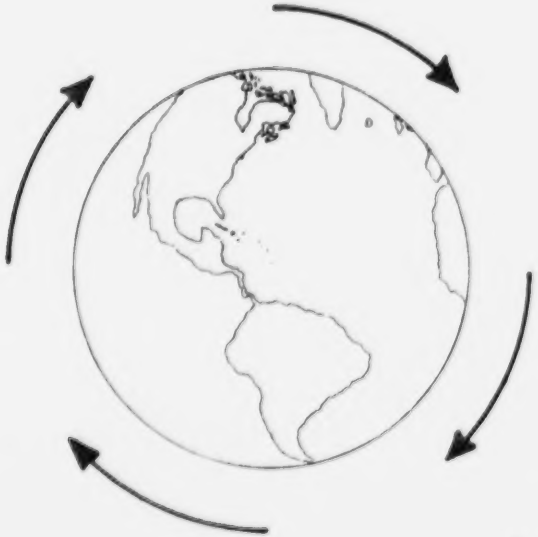


where does this matter come from?

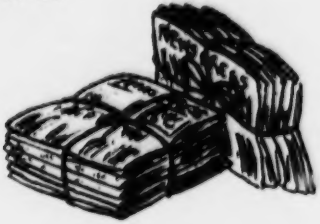
The answer is it has been here all along. You see, the planet Earth can not get any <u>new</u> matter.

When the planet was formed, we got all of the matter we are ever going to get.

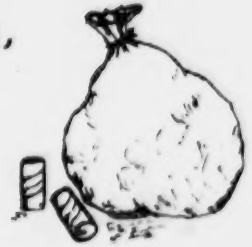
Ever since that time, matter has been re-cycling on the Earth. Recycling means to use things over again.



Nowadays, people have begun to re-cycle things like newspapers,



aluminum cans,



glass bottles,

and many other things.

The planet Earth has been recycling matter in this way since it was first formed.

Nothing can really be "thrown away". Because there is no place else for things to go.

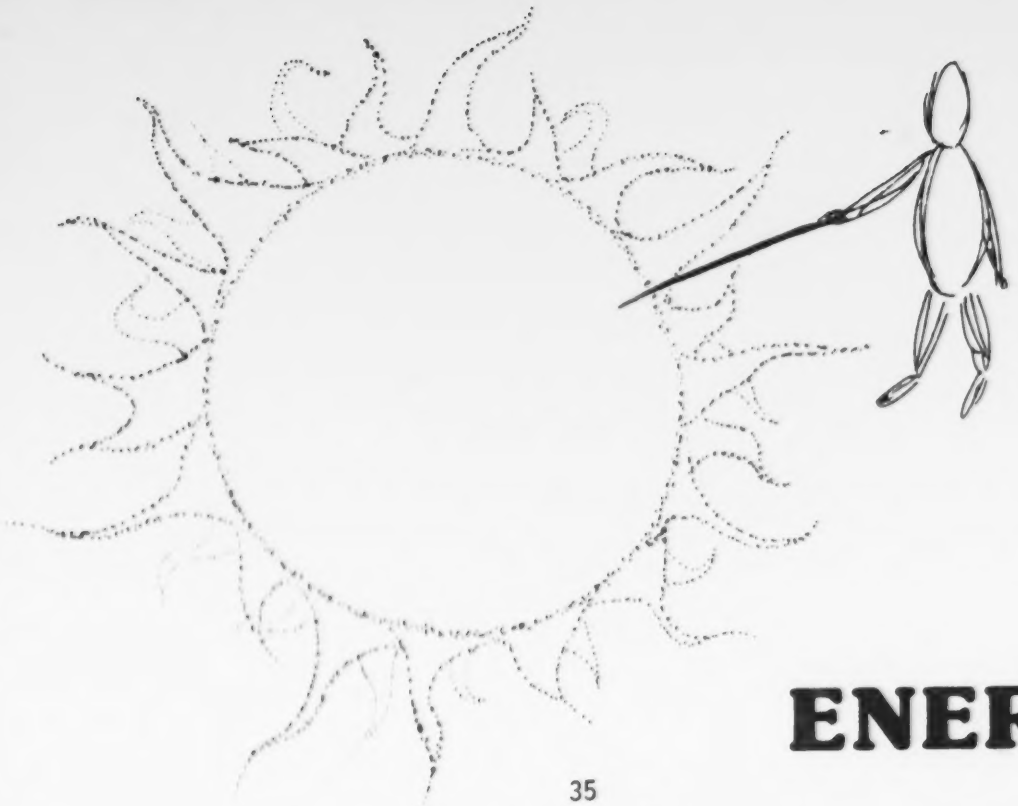
When you put out your trash, a truck may come and take it away.

But the trash doesn't just disappear. It is still part of our home, the Earth.

For this reason, we have to be careful about the things we "throw away". Otherwise, we may find pollution in our air, soil, and water.

Everything that is on the Earth today was on the Earth many years ago. And it will be on the Earth many years from now.

But it may be in a very different form.



ENERGY

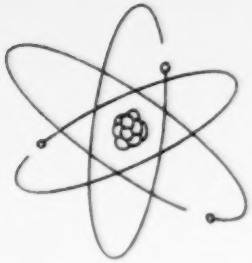
The simplest way to define Energy is...

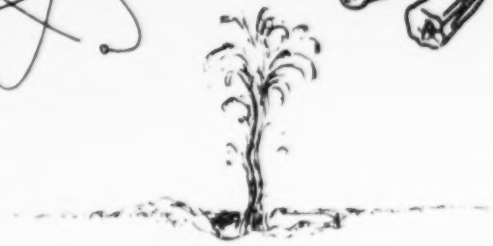
something that can make things change.

Energy is needed to drive our cars, to heat our houses, to cook our food, and for many other things.

Living things, like you and me, need energy to grow.

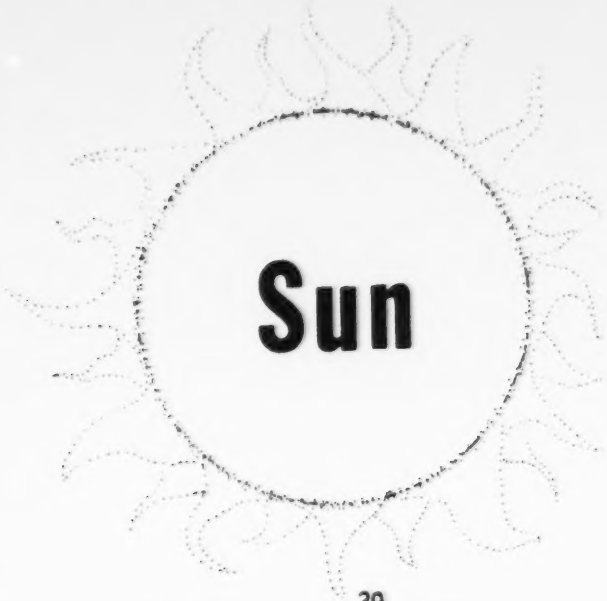
There are many forms of energy. All of these forms of energy have one thing in common.





They all received their energy from the Sun.

The Sun is the source of <u>all</u> of the energy on the Earth.



Energy is not matter, but it is important to the way matter is re-cycled.

MATTER CYCLES...

ENERGY FLOWS...

Unlike matter, energy <u>can</u> <u>not</u> be re-cycled.

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It only goes in one direction.

The Sun sends energy to the Earth.

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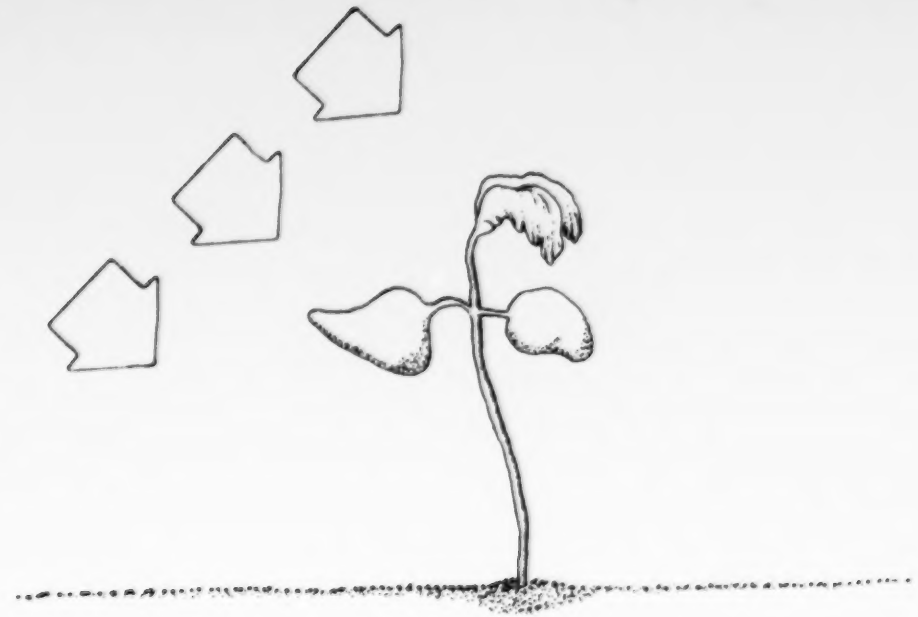
This energy is available to everything on the Earth.



Green plants can use the energy to make food and to grow.

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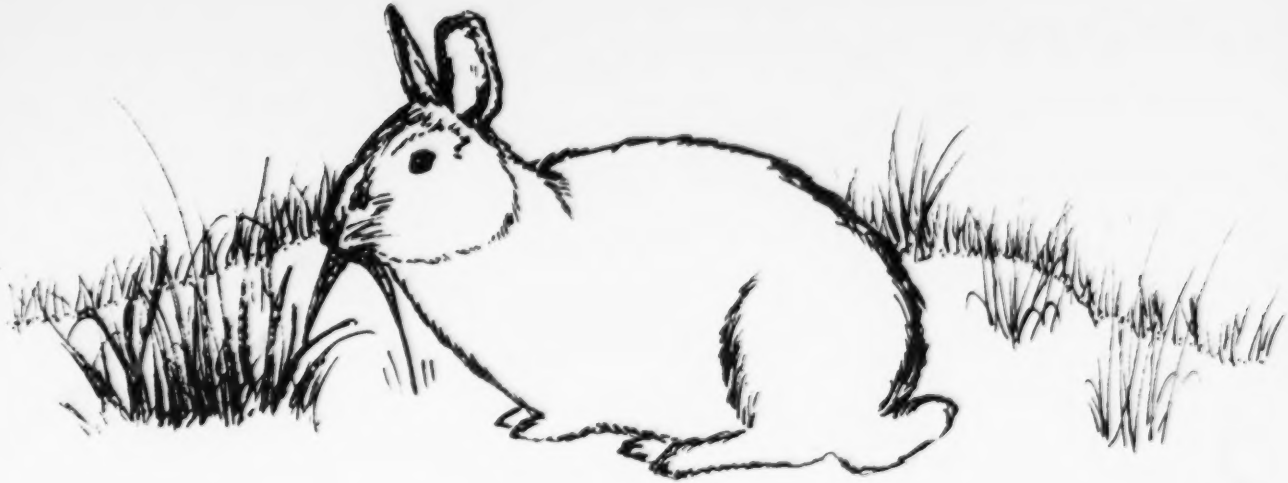
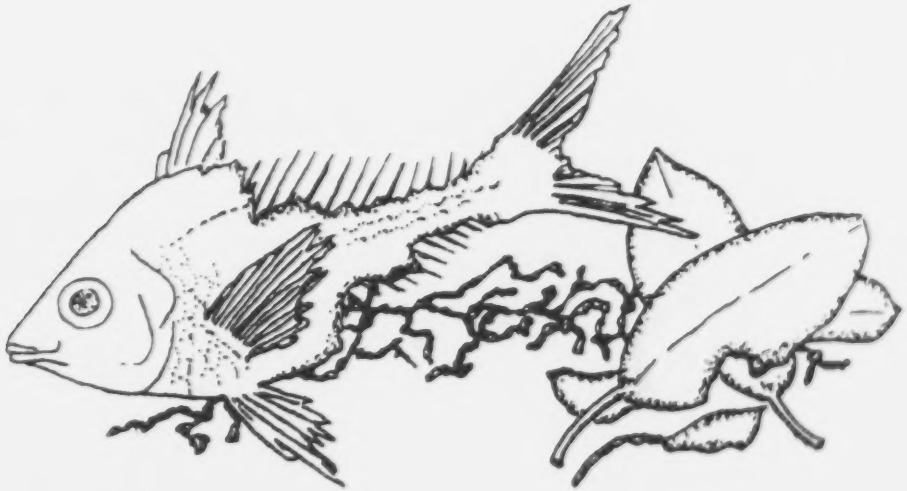
Animals that eat plants get some of the Sun's energy.



Some animals get their energy by eating other animals.

Some plants and animals get the energy they need to live by eating dead animals or plants.



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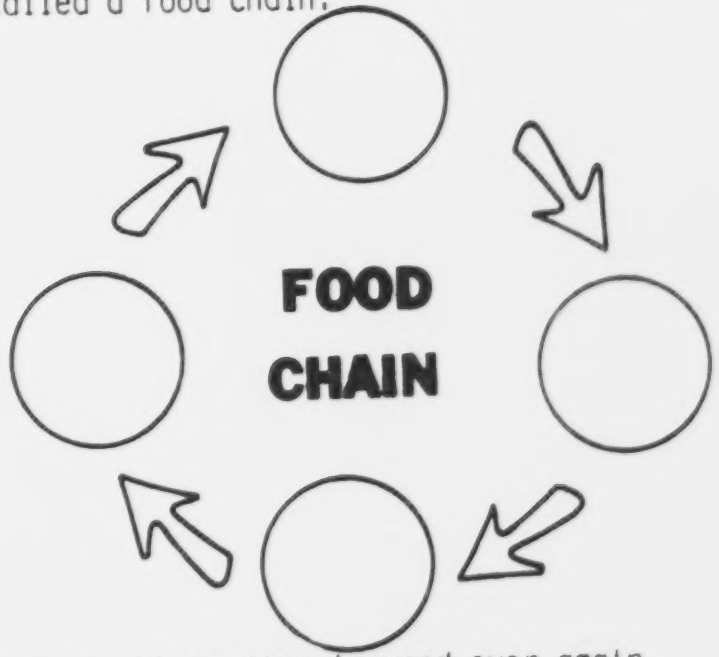
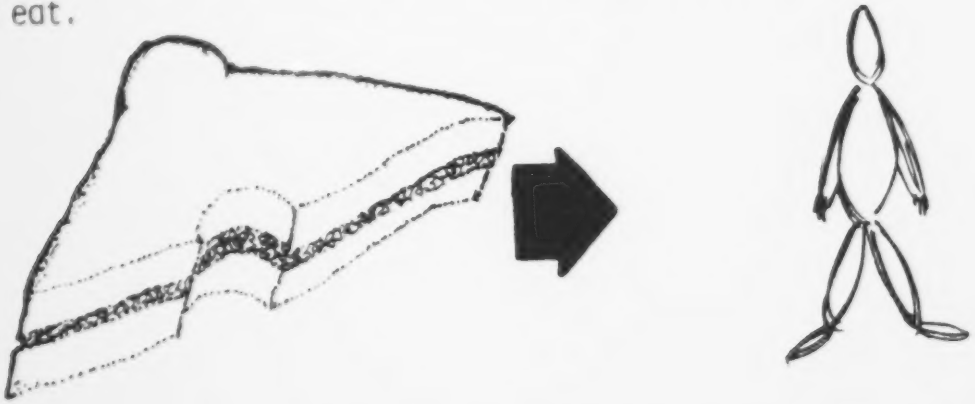
This is called a food chain.



In a food chain the <u>matter</u> is used over again.

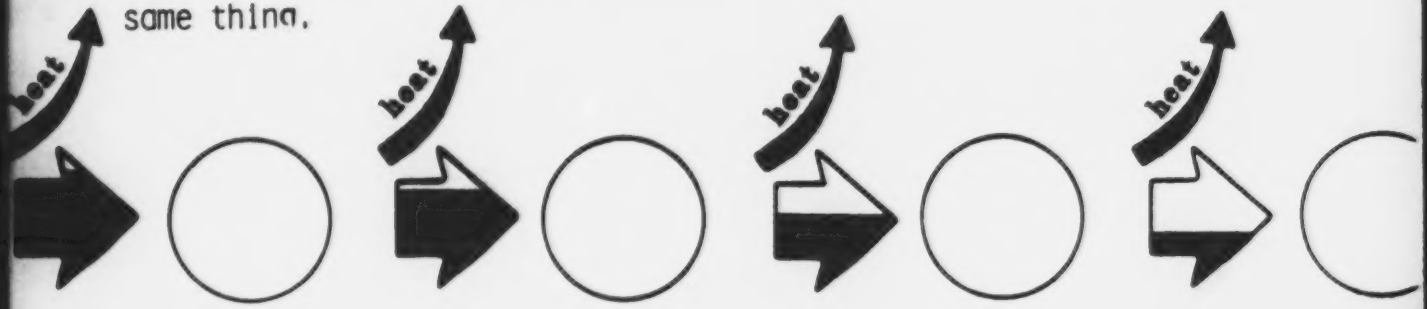
When you break apart matter, you can get energy out of it.

When we eat something, we get the energy that is in the matter we eat.



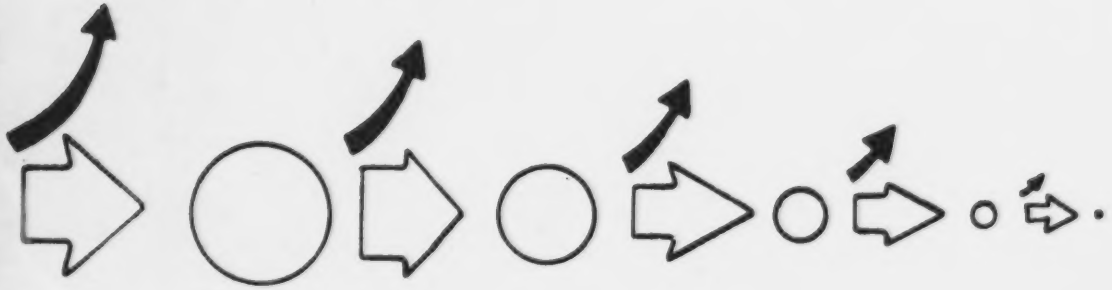
The energy in the matter of a peanut butter and jelly sandwich is used to grow our muscles and bones.

So you see, matter and energy are very closely related. Some scientists say that matter and energy are different forms of the same thing.



One thing we do know is that since energy can not be recycled, each step in a food chain has less energy from the Sun than the step before. Some energy in each step is turned into heat and goes into the air.

If the Sun ever stopped sending energy to the Earth, all the food chains would end.



And the Earth would run down and stop.

LIFE

Life is a difficult word to define.

People have defined it in many ways.

Maybe one of the reasons that it is so hard to define is that we just seem to know when something is alive or not alive.

There are some things that we can easily see are alive.

like trees,

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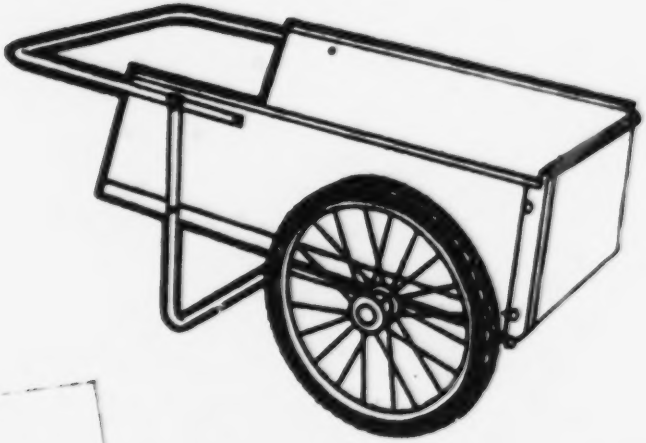
and butterflies,

and people.

Other things are definitely not alive.

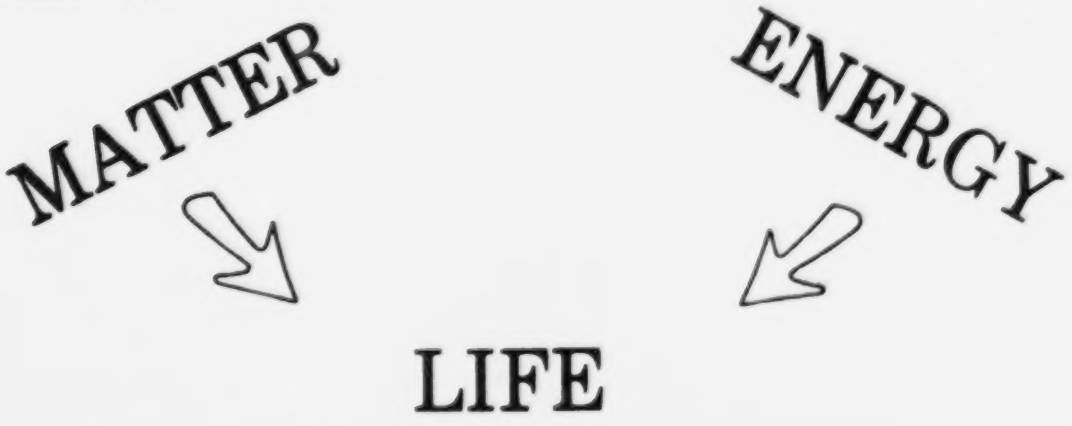
like rocks,

and wheelbarrows,



and this book.

Life is a special relationship between matter and energy. Life depends more on how things are put together than what they are made from.



All living things are made from matter and they need energy to remain alive.

All things that are alive have some things in common. And they are all different from those things that are not alive.

ALIVE	NOT ALIVE
trees	**rocks**
butterflies	**wheelbarrows**
people	**this book**

But sometimes it is still not easy to decide if something is alive or not.

Think about an apple tree.

We know that the tree is alive. What about the apples hanging from the tree?

Are they alive?

Do apples <u>die</u> when we pick them? Are they dead when we eat them?

Maybe only the seeds inside the apple are alive. After all, the seeds can grow into a new apple tree.

There are some people who say that <u>everything</u> is alive. Even the planet Earth. The Earth certainly seems to be alive in some ways.

It was born.

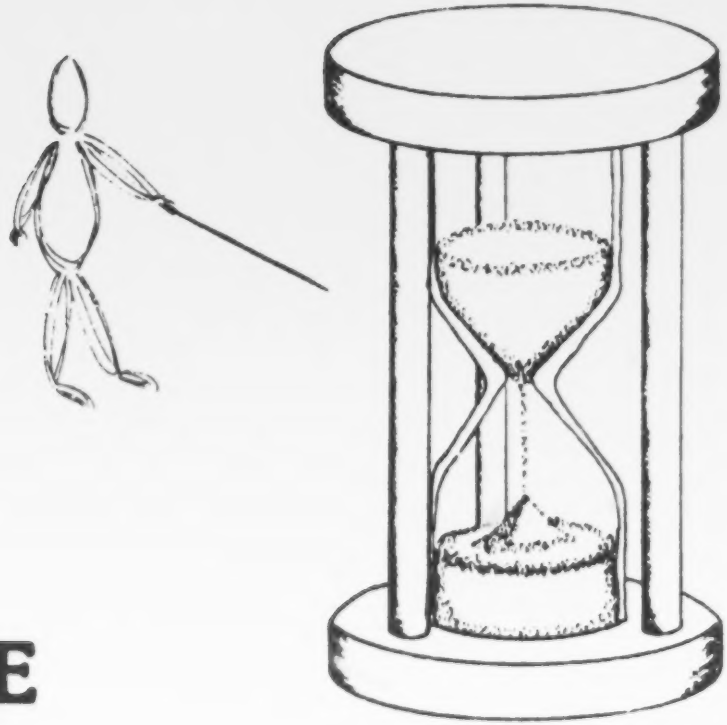
It moves.

It changes.

It can respond to things that happen to it.

It can get sick and maybe even die.

Maybe the planet Earth is the largest living thing we know of.



TIME

Time may be the hardest thing to understand. It is "going" all of the time, even though we never see it.

31536000 seconds = 525600 minutes = 8760 hours =

We measure time in seconds, minutes, hours, days, weeks, months, and years.

But what do we mean by a long time?

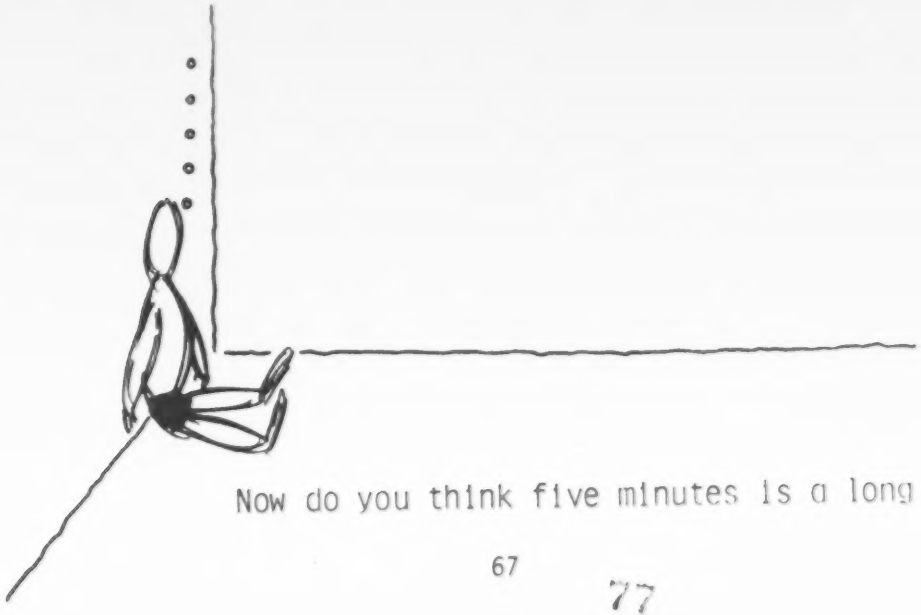
365 days = 52 weeks = 12 months = 1 year

Is five minutes a long time?

Suppose you wanted to stay up and watch TV one night and your parents said, "Just five more minutes".

Is that a long time?

Now suppose you were holding your breath at the bottom of the pool, and your swimming instructor said, "Just five more minutes".



Now do you think five minutes is a long time?

Is a lifetime a long time? If you were a redwood tree, you might live for 1000 years.

If you were a fruit fly, you might only live for a couple of days.

Do you think redwood trees and fruit flies think of time differently?

Let's look at time a little differently, so we can "see" time.

Let's place a penny on the ground for each year that you have been alive.

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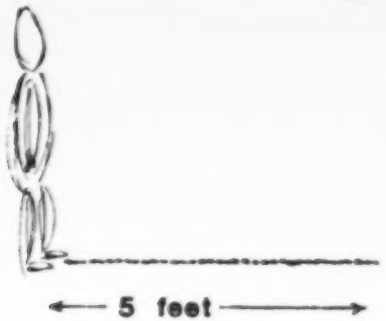
If you live to be 80 years old, you will have a row of pennies that stretches for five feet.



That will represent your life-line.

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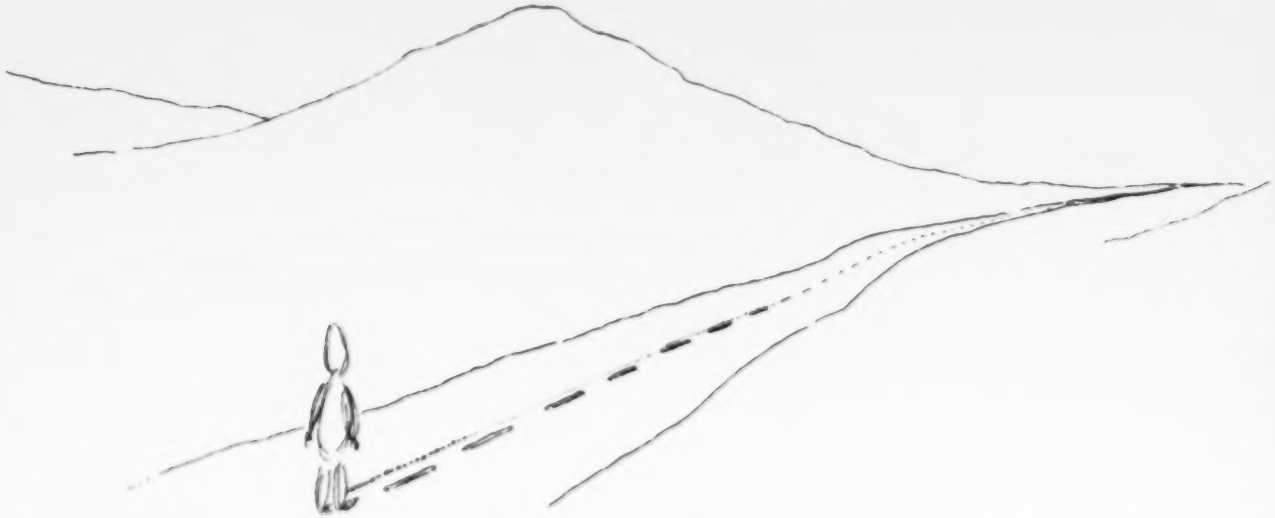
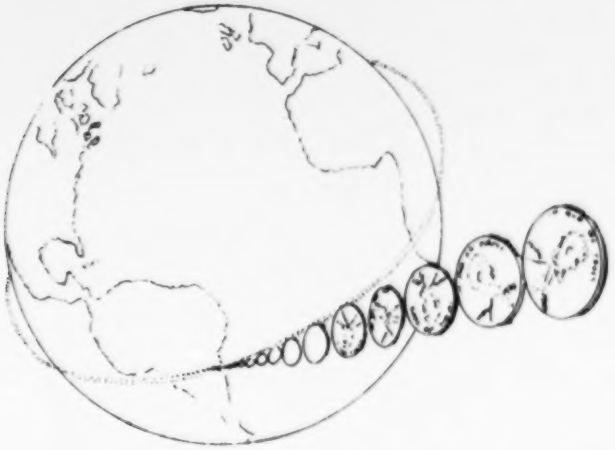
Some scientists say that there have been people living on the Earth for at least 3 million years. That's 3,000,000!



If we lay out 3 million pennies, our row of pennies will stretch for over 35 miles.

Most scientists say that the Earth has been around for about 5 billion years. That's 5,000,000,000!



A row of 5 billion pennies will stretch for about 59,186 miles. That is over 2 and 1/3 times around the Earth.

Time is really a relative thing. It all depends upon how you look at it.

Sometimes it goes very s l o w l y . . .

And sometimes it is gone before you know it.

THE

END

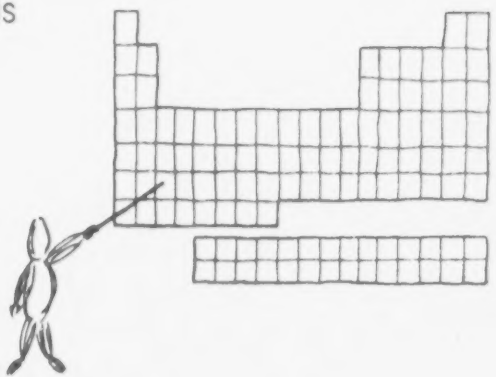
But, every ending

is also a new beginning.

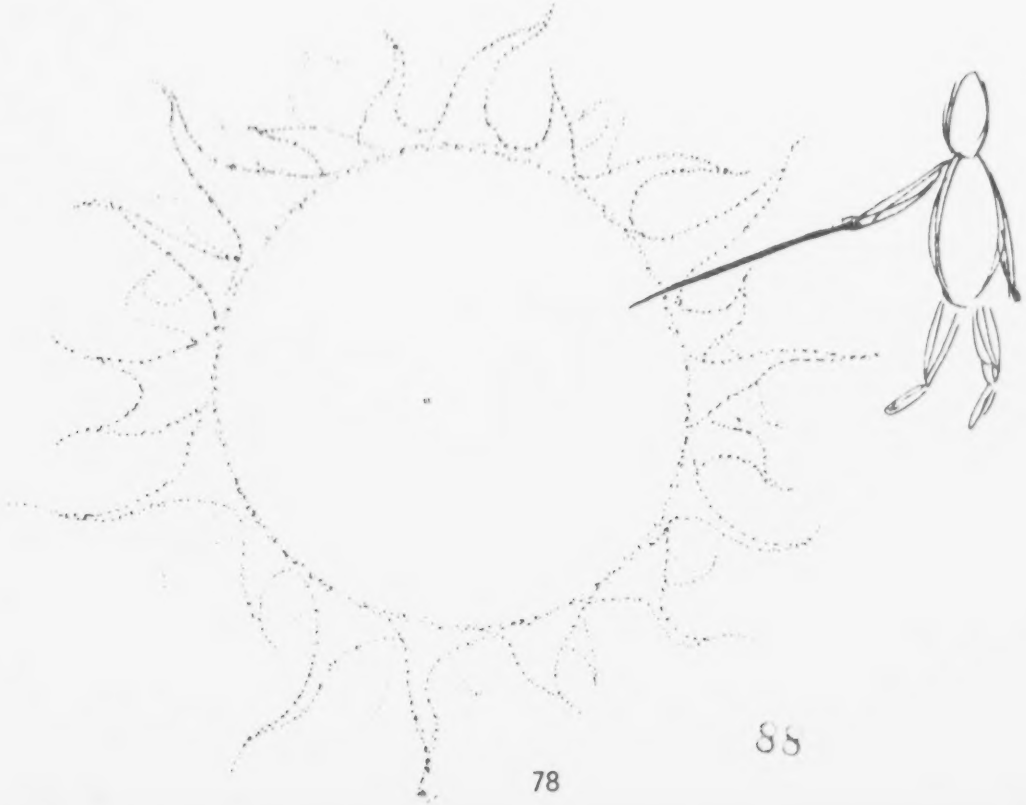
Let's take another look at what you have learned.

Now you know that everything on Earth is made of matter.

And that all of this matter has been recycling here on the Earth since the Earth was first formed.



MATTER



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You know the energy is needed by all living things.

And that all of the energy on Earth can be traced back to the Sun.

And you know that, unlike matter, energy cannot be recycled.

We need to receive new energy from the Sun for life to continue.

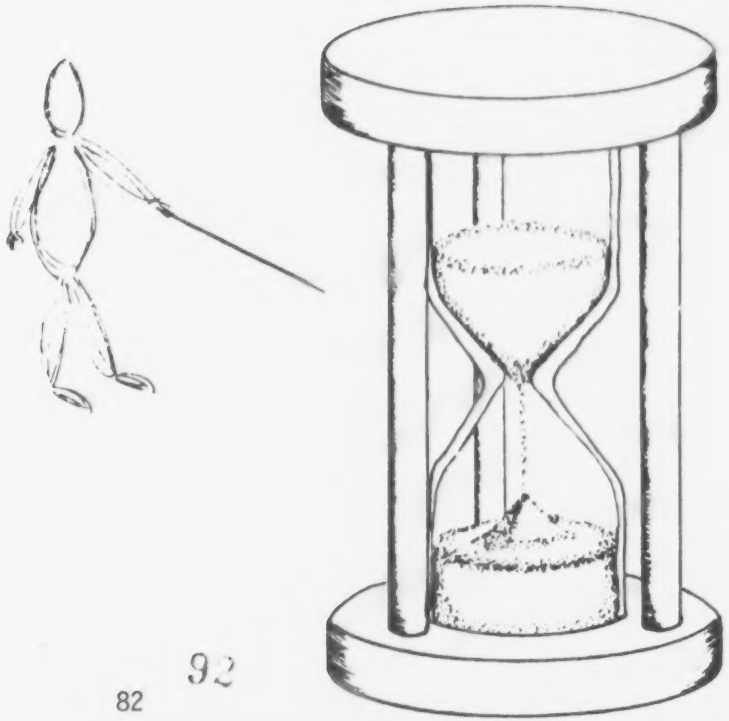
ENERGY

Speaking of life, you now know that life may not be as easy to define as you thought it was.

Life is a special relationship between matter and energy.

All things on the Earth are made of matter, and living things need energy to remain alive.

LIFE

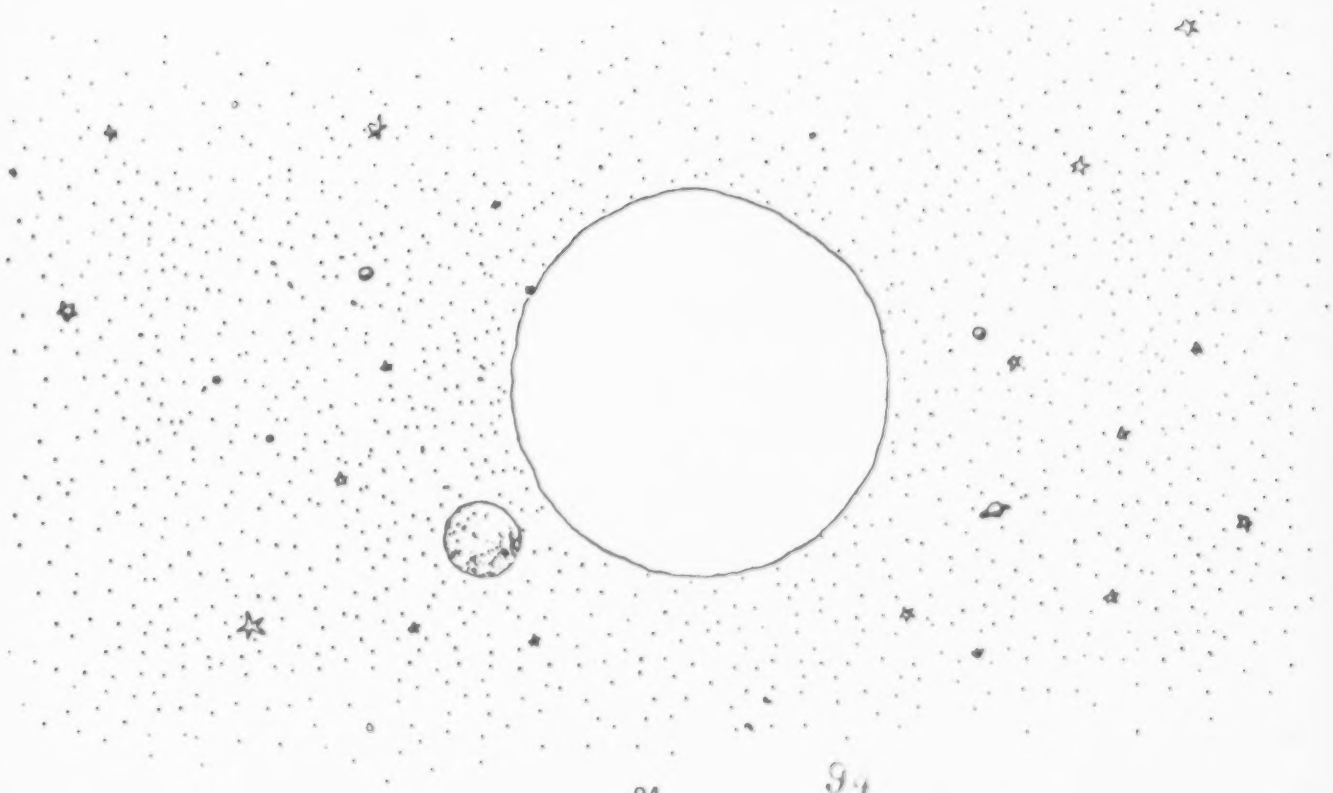


You've learned some interesting things about time, too.

You know that the way we think about time may be different from the way other living things do.

And you know that people have been living on the Earth for a long time.

TIME



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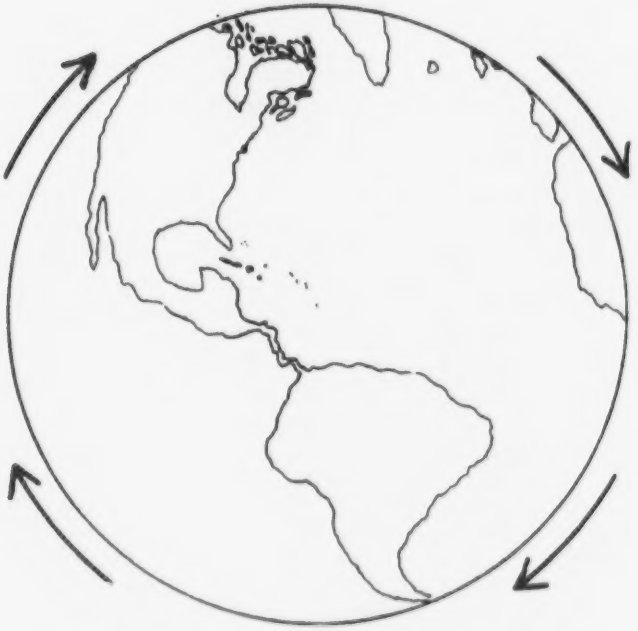
But the Earth has been here for a long, long, long time.

In fact, the Earth is so old it is hard for us to think of its age.

And, even though we have been here for a long time,

to the Earth, we've just arrived.



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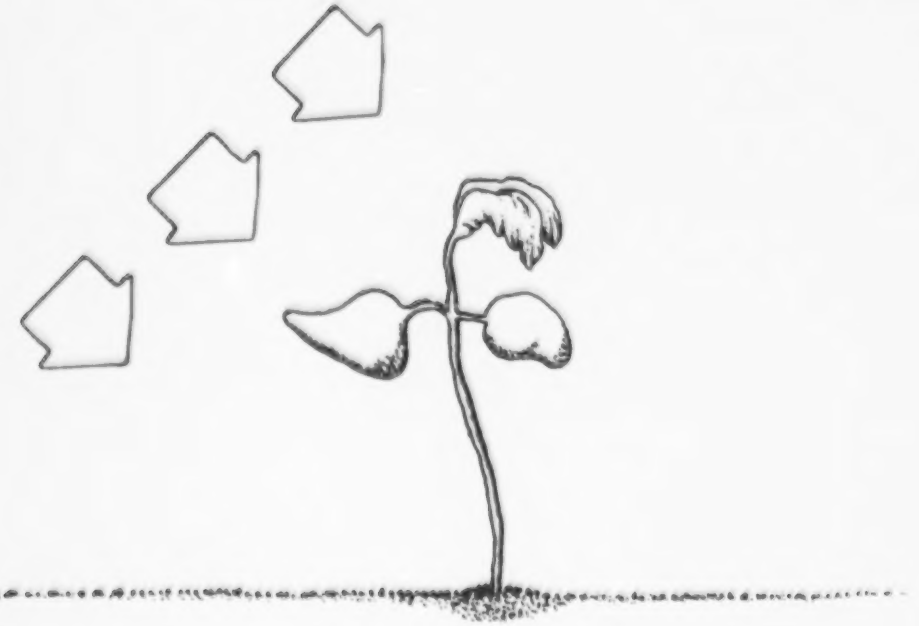
And what else have you learned?

I hope you have learned about what you can do to help make this Earth a great place to live.

REMEMBER, there is no "away".

Everything on the Earth has to be used over and over again.



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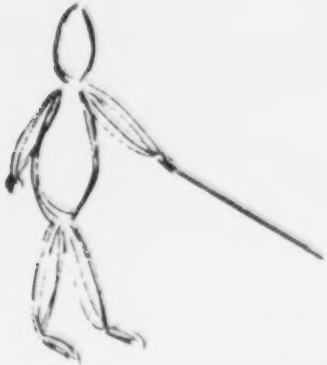
REMEMBER that all living things need energy.

We need to use energy carefully so we don't waste it.



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REMEMBER that, here on Earth, there are many different kinds of living things.

All these living things need energy.

And they need each other, too.

You've learned quite a lot.

And that is what science is all about.

It's thinking about complicated ideas that may seem simple.

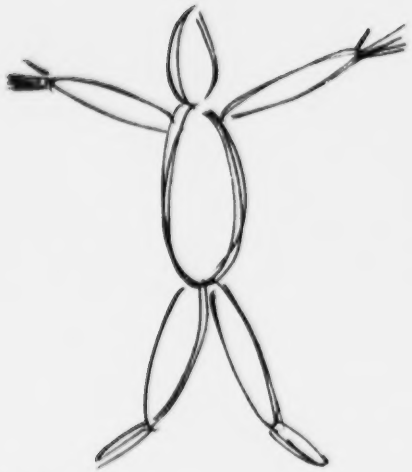
And working very hard to experiment,

to dream,

to measure,

to record,

to explore.



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And caring enough to not give up trying to find the answers to simple ideas that may be very complicated.

And realizing that we don't have the answers to all of our questions.

In fact, some questions may never get answered.

But we can use what we have learned.

And we can share a long life together with the Earth and all of the other living things here.

If we remember....